City of Kansas City Missouri

Public Works Department

Materials Testing Requirements

Materials Testing & Inspection Laboratory

Test frequencies per Engineered City Standards & Specifications for construction within the city right of way

All Testing to be performed at Frequencies shown or as deemed necessary by the engineer or their designated project representative.
All tests shall be performed by the PW Materials Testing Lab or an approoved, certified, 3rd Party testing lab.

Testing is performed per direction given by the engineer or designated city project representative. Technical Services provided by the KCMO-Public Works Materials Testing Laboratory are Scheduled by calling **The Testing Request HOTLINE**. Requests made one work day in advance assures Scheduling of required Testing. Test Timeframes shown indicate estimated time required for a single test and do not include travel time or time associated with delays in construction, or materials or product delivery.

The Testing Request HOTLINE
816 - 513 - 4720

1. EARTHWORK			
A. Materials Verification 2102.2			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Atterberg Limits : Sampling, Atterberg Limits, Natural Moisture, Gradation (if required) Standard Proctor : Following review of Atterberg Limit results, a determination of Suitability is made by the engineer. If approval of the material proposed for use in construction is authorized, a Standard Proctor will be run per the engineer's direction. NOTE: If the project specification requires a record showing that Specified Densities were achieved by the Compactive effort in the Field, a Standard Proctor must be run before Field Density / Compaction Testing can be performed.	Prior to the start of construction activity, each type of material identified and proposed for use as Fill in the project will be Sampled. Additional Samples will be needed for Testing if the type, source or character of the materials proposed for use as Fill in the project change.	After Fill material has been identified and Sampled, Atterberg Limits will be run. Testing Time: 1 - 2 Days If the proposed material is deemed Suitable and approved for use in construction, a Standard Proctor will be run per the engineer's direction. Testing Time: 1 – 3 Additional Days, upon authorization being received from the engineer (see Standard Proctor)	Report Atterberg Limits: Liquid Limit, Plastic Limit, Plasticity Index, Fraction Passing #200 sieve, Natural Moisture Report Standard Proctor: Maximum Dry Density, Optimum Moisture content

1. EARTHWORK (continued)

B. Embankment or Structural Backfill Placement 2102.6

TEST PROCEDURE	FREQUENCY	TIMEFRAME	OUTPUT
Field Density / Compaction Testing and Moisture Content NOTE: A Standard Proctor must be run before Field Density / Compaction Testing can be performed. See 1.A.	One set of 3 tests per lift with a minimum of one set of tests per day. One in-place moisture/density test for each 25 cy of Fill or fraction thereof when compacted by hand operated machine, with at least three tests for each material type placed each day.	Testing Time: 10 min/test	Report: In-Place Dry Density, Percent Compaction, Percent Moisture and Location of each test completed.

C. Subgrade 2201.3

TEST PROCEDURE	FREQUENCY	TIMEFRAME	OUTPUT
Field Density / Compaction Testing and Moisture Content NOTE: A Standard Proctor must be run before Field Density / Compaction Testing can be performed. See 1.A.	One set of 3 tests per 300 lf. of subgrade or fraction thereof, per lane. Two tests per lane for projects less than 300 lf.	Testing Time: 10 min/test	Report: In-Place Dry Density, Percent Compaction, Percent Moisture and Location of each test completed.

D. Trench 2602.3, 2102.6, 2507.3

TEST PROCEDURE	FREQUENCY	TIMEFRAME	OUTPUT
Field Density / Compaction Testing and Moisture Content NOTE: A Standard Proctor must be run before Field Density / Compaction Testing can be performed. See 1.A.	One set of 3 tests per 100 lf. of trench per lift when under roadway. Otherwise one set of three tests per 300 lf. of trench per lift.	Testing Time: 10 min/test	Report: In-Place Dry Density, Percent Compaction, Percent Moisture and Location of each test completed.

2. UNTREATED COMPACTED AGGREGATE BASE

A. Materials Verification 2202.2

TEST PROCEDURE	FREQUENCY	TIMEFRAME	OUTPUT
Gradation : Sampling, Gradation, Plasticity Index, Source Verification Standard Proctor : Following review of Gradation, a determination of Suitability is made by the engineer. If approval of the material proposed for use in construction is authorized, a Standard Proctor will be run per the engineer's direction. NOTE: If the project specification requires a record showing that Specified Densities were achieved by the Compactive effort in the Field, a Standard Proctor must be run before Field Density / Compaction Testing can be performed.	Prior to the start of construction activity, each type of material identified and proposed for use as Base in the project will be Sampled. Additional tests will be conducted if the type, source or character of the materials proposed for use as Fill in the project change.	After Base material is Sampled, Gradation will be run. Quarry may be visited. Testing Time: 1 - 2 Days If the proposed material is deemed Suitable and approved for use in construction, a Standard Proctor will be run per the engineer's direction. Testing Time: 1 – 3 Additional Days, upon receipt of authorization by the engineer (see Standard Proctor)	Report Gradation : Percent Passing each specified sieve, Gradation, Plasticity limits, Natural Moisture Report Standard Proctor : Maximum Dry Density, Optimum Moisture content

2. UNTREATED COMPACTED AGGREGATE BASE (continued)			
B. Placement, 2202.3			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Field Density / Compaction Testing and Moisture Content NOTE: A Standard Proctor must be run before Field Density / Compaction Testing can be performed. See 1.A.	One test per 150 sy. per lift placed with a minimum of one test per day. One test per 25 sy or fraction thereof when hand operated machines are used.	Testing Time: 10 min/test	Report: In-Place Dry Density, Percent Compaction, Percent Moisture and Location of each test completed.

3. CONCRETE			
A. Approved Supplier Plant Verification 2208.2			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Plant Prequalification per KCMO-PW Quality Management Plan (QMP)	Year-round	Plant inspections are both random and periodic.	List of prequalified Ready-Mix Concrete Suppliers is available on the PW Design & Construction Standards Web Page, or from KCMO-PW Lab.
Large-Volume Paving Day, Bridge Deck or Critical Production - Plant Inspection	Daily - when over 250 cy is scheduled for production on a city project in one shift, or during major structural concrete placement.	Materials Inspector monitors quality assurance testing and maintains quality of product during production.	Direct coordination with Plant, On-Site Materials Technician and Construction Inspector (as needed).

3. CONCRETE (continued)			
B. Concrete Paving and Pavement Repairs 2208.2			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Air Content, Slump, Compression Strength Test Cylinders, Concrete Temperature, and Unit Weight* (upon request) Test results will be compared to the properties contained in the "approved concrete mix design" provided by the engineer.	One test for each 50 cy or part thereof, per day. Additional Testing, as directed in the Field. If the concrete mix delivered to the project Site changes, the designated project Field representative is to notify the materials technician before Testing begins.	Testing Time: 20 min/test	Report: Concrete Temperature, Slump, 7 and 28 Day Compression Strength test results and Unit Weight*. (Early breaks requested will be reported immediately) Report transmitted following 28 Day Strength Testing, unless otherwise requested.
C. Concrete Sidewalks/Driveways/Curbs/ Non-Structural 2301.2, 2209.2			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Air Content, Slump, Compression Strength Test Cylinders, Concrete Temperature, and Unit Weight* (upon request) Test results will be compared to the properties contained in the "approved concrete mix design" provided by the engineer.	One test for each 100 cy or part thereof, per day. Additional Testing, as directed in the Field. If the concrete mix delivered to the project Site changes, the designated project Field representative is to notify the materials technician before Testing begins.		Report: Concrete Temperature, Slump, 7 and 28 Day Compression Strength test results and Unit Weight*. (Early breaks requested will be reported immediately) Report transmitted following 28 Day Strength Testing, unless otherwise requested.

3. CONCRETE (continued)			
D. Concrete-Structural 2703.3, 2703.4, 2703.7			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Air Content, Slump, Compression Strength Test Cylinders, Concrete Temperature, and Unit Weight* (upon request) Test results will be compared to the properties contained in the "approved concrete mix design" provided by the engineer.	One test for each 50 cy or part thereof during each pour. Additional Testing, as directed in the Field. Notification should be provided by the designated project Field representative if the concrete mix delivered to the work site changes.	Testing Time: 20 min/test	Report: Concrete Temperature, Slump, 7 and 28 Day Compression Strength test results and Unit Weight*. (Early breaks requested will be reported immediately) Report transmitted following 28 Day Strength Testing, unless otherwise requested.

4. HOT MIX ASPHALT			
A. Approved Supplier Plant Verification 2205.3			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Review of plant type, equipment, weighing devices, material source verification	Annual (or as needed when new Plants are proposed for production in city projects)	Annual Plant inspections are performed April-May every year	List of prequalified Plants available from The KCMO-PW Lab

4. HOT MIX ASPHALT (continued)			
B. Paving Operation 2205.3, 2205.8			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Asphalt Testing - Marshall Method (Mix Types 1, 2, 3, 4): As required to determine characteristics and properties of the asphalt mix for confirmation and acceptance, each day of production (compare results to the approved mix design/job mix formula, per tolerances allowed in the project technical specification).	Minimum of one test per each 1000 tons or part thereof until 4 consecutive tests pass. Then a minimum one test per each 3000 tons or part thereof per day.	Testing Time: 4hrs/sample	Report Asphalt: Gradation of aggregate materials, range of gradation allowed, asphalt content, range of asphalt content allowed, theoretical maximum specific gravity, density, percent air voids. Report (Laboratory) Compaction: Specific gravity, density, Marshall stability and flow, allowed range for the Marshall stability and flow.
Asphalt Testing - Super Gyratory Compactor (SGC) Method (Mix Types 5, 6): As required to determine characteristics and properties of the asphalt mix for confirmation and acceptance, each day of production (compare results to the approved mix design/job mix formula, per tolerances allowed in the project technical specification).	Minimum of one test per each 500 tons or part thereof until 4 consecutive tests pass. Then a minimum one test per each 1000 tons or part thereof per day (per 2205.3.J.4).	Testing Time: 4hrs/sample	Report Asphalt: Gradation of aggregate materials, range of gradation allowed, asphalt content, range of asphalt content allowed, theoretical maximum specific gravity, density, Va (% air voids), VMA (voids mineral aggregate), VFA (voids filled asphalt). Report (Laboratory) Compaction: Specific gravity, density.

4. HOT MIX ASPHALT (continued)			
	B. Paving Operation 2205.3, 2205.8		
Field Compaction Test (Density): Verify effectiveness of Rolling operation (compaction effort) operation in the Field	One test for each 1000 tons or part thereof.	Testing Time: 10 min/test	Report Density: Test Location, Maximum bulk density, Density, Percent compaction at each test location
Drilled cores: Verify thickness, condition / appearance and density of new asphalt pavement.	As needed or when directed by the engineer or designated representative	Testing Time: 1hr/core	Report Density: Test Location, Maximum bulk density, Density, Percent compaction at each test location

6. PRECAST AND PRESTRESSED CONCRETE PRODUCTS			
A. Approved Supplier Plant Verification 2510.3, 2604.2			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Plant Prequalification per KCMO-PW Quality Management Plan (QMP)	Year-round	Plant inspections are both random and periodic.	List of prequalified Precast Concrete Plants is available on the PW Design & Construction Standards Web Page, or from KCMO-PW Lab.

6. PRECAST AND PRESTRESSED CONCRETE PRODUCTS (continued)			
B. Pre-stressed Bridge Beams or Other Major Structural Members 2702.1, 2702.2			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Verify Materials Source, Materials and Scales/Gauges Certification, Bed Checks (Dimensions, Steel, Cables, Voids, Hardware), Cable Tensioning, Slump, Air Content, Test Cylinders, Temperature, Compressive Strength, Cut-down (of cables), Post-production Inspection, Finish/Dressing, Handling/Lifting & Release	City representative present (as required for each Inspection) during each Phase of Set-Up and for Quality Assurance Testing and concrete placement (each Pre-Stressed Structure). Test frequency in accordance with the applicable specification.	Inspections performed Daily, as needed. Daily Schedule varies for Inspections required in each production phase.	Report: Complete record on fabrication of each structure, including: Materials Certifications, Bed Checks, Tensioning, Concrete Temperature, Slump, Cut-down and 28 Day Compression Strength. Report transmitted following 28 Day Strength Testing.
C. Manholes, Catch Basins, Pipe of Routine Manufacture 2510.6, 2604.2			
TEST PROCEDURE	**FREQUENCY**	**TIMEFRAME**	**OUTPUT**
Visual Inspection of Precast concrete structures after transport and delivery to Field construction Site. Assess physical condition and integrity of structures post-production, per tolerances allowed in KCMO/APWA technical specifications.	At the request of the engineer or designated Field representative	Review Time: 30-60 min/each	Report: Each structure inspected receives "pass" "fail" stamp. Deficiencies found are marked on structure. Inspector is notified of findings.

6. PRECAST AND PRESTRESSED CONCRETE PRODUCTS (continued)

D. Precast concrete supplier certification program

TEST PROCEDURE	FREQUENCY	TIMEFRAME	OUTPUT
Plant Prequalification per KCMO-PW Quality Management Plan (QMP)	Year-round	Plant inspections are both random and periodic.	List of prequalified Precast Concrete Plants is available on the PW Design & Construction Standards Web Page, or from KCMO-PW Lab.

E. Precast concrete special items of uncommon manufacture or not of a common inventory stock

OR

Items of common manufacture that are modified for other than standard pipe openings.

TEST PROCEDURE	FREQUENCY	TIMEFRAME	OUTPUT
Pre-production & Construction Inspection: Materials Source, Materials and Scales/Gauges Certification, Form Check (Dimension, Reinforcing, Hardware), QA Testing Oversight (Slump, Air Content, Test Cylinders, Temperature, Compressive Strength), Post-production Inspection, Finish/Dressing, Handling/Lifting Devices.	At the request of the engineer or designated Field representative	Review Time: 30-60 min/each	Deficiencies found are corrected prior to loading for delivery to job site. Structure inspected receives "pass" "fail" stamp.